299-E33-14 (A4841)

Log Data Report

Borehole Information:

Borehole:	299-E33-14 (A4841)		Site:	East of 216-B-8 Crib	
Coordinates (WA State Plane)		GWL (ft)[1]:	223.81	GWL Date:	12/27/01
North	East	Drill Date	TOC[2] Elevation	Total Depth (ft)	Type
137,567 m	573,617 m	Dec. 1953	625.4 ft	230	Cable Tool

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Steel Welded	2.45	8.625	8.0	0.3125	+2.45	228

Borehole Notes:

The logging engineer measured the stickup using an engineer's tape. Stickup was measured between an engraved "X" on top of the casing and the concrete pad's surface. A 4' x 4' x 6" concrete pad on the ground surface surrounds the casing. HWIS[3] is the source of the TOC elevation. Casing bottom (TOC reference) is reported from information provided on the as-built drawing (HWIS[3]) for this borehole. Total depth and groundwater depth were measured by the Duratek Federal Services well service crew when the pump was pulled on 12/27/01. This well was swabbed on 1/10/02, and no contamination was detected.

Logging Equipment Information:

Logging System:	Gamma 1D		Type:	SGLS (35%)
Calibration Date:	07/01	Calibration Reference:	GJO-2001-243-TAR	
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0	

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2	3	4	5
Date	01/16/02	01/17/02	01/22/02	01/23/02	01/23/02
Logging Engineer	Pearson	Pearson	Pearson	Pearson	Pearson
Start Depth (ft)	3.0	46.5	106.0	230.0	227.0
Finish Depth (ft)	47.5	107.0	203.5	202.5	200.0
Count Time (sec)	100	100	100	100	100
Live/Real	R	R	R	R	R
Shield (Y/N)	N/A[4]	N/A	N/A	N/A	N/A
MSA Interval (ft)	0.5	0.5	0.5	0.5	0.5
ft/min	N/A	N/A	N/A	N/A	N/A
Pre-Verification	A0076CAB	A0078CAB	A0079CAB	A0080CAB	A0080CAB
Start File	A0077000	A0078000	A0079000	A0080000	A0080056
Finish File	A0077089	A0078121	A0079195	A0080055	A0080110
Post-Verification	A0077CAA	A0078CAA	A0079CAA	A0080CAA	A0080CAA

Log Run	1	2	3	4	5
Depth Return Error (in.)	0	0	-1	-1.5	-1.5
Comments	No fine-gain adjustments made.	No fine-gain adjustments made.	No fine-gain adjustments made.	No fine-gain adjustments made.	Repeat section, 227 - 200 ft. No fine-gain adjustments made.

Logging Operation Notes:

Zero reference is the top of casing.

Logging was performed with the centralizer on the sonde. The logging system was moved to this location from borehole 299-E33-17, file name A0076. Water appears to be at or near the reported depth of 223.5 ft. On 01/23/02, the sonde was in a plastic bag during logging.

Analysis Notes:

Analyst:	Sobczyk	Date:	01/31/02	Reference:	MAC-VZCP 1.7.9 Rev. 2

Pre-run and post-run verification spectra were collected at the beginning and end of each day. The recorded peak counts per second (cps) for the 609-keV peak, 1461-keV peak, and 2615-keV peak were consistently lower each day in the post-run verification as compared to the pre-run verification. This change varied from 10 to 13 percent. The cause of this discrepancy is being investigated. Evaluation of the spectra indicates that the detector is functioning normally, and the log data are provisionally accepted, subject to further review and analysis. The post-run verification spectra were used to determine the energy and resolution calibration for processing the data using APTEC SUPERVISOR.

Individual spectra were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Concentrations were calculated in EXCEL (source file: g1dcalc4.xls), using parameters determined from analysis of calibration data collected in June 2001. Zero reference is the top of the casing. Based on the As-Built diagram (HWIS[3]) and the observations of the logging engineer, the casing configuration was assumed to be one string of 8-in. casing with a thickness of 0.3125 in. to a log depth of 230 ft. This casing thickness is consistent with the logging engineer's measurements. A water correction was applied at 224 ft. Dead time corrections were not needed because dead time did not exceed 10.5 percent.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K, ^{238}U, and ^{232}Th), and man-made radionuclides. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. In addition, comparison log plots of man-made radionuclides and gross gamma are provided to compare the data collected by Westinghouse Hanford Company's (WHC) Radionuclide Logging System (RLS) with SGLS data. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation. The plot of the repeat log demonstrates good repeatability of the SGLS data for both the man-made and naturally occurring radionuclides.

Results and Interpretations:

^{60}Co was detected in significant amounts in this borehole. In addition, ^{137}Cs contamination was detected near the MDL (about 0.3 pCi/g) at log depths 168.5, 214, and 214.5 ft. ^{60}Co was detected at 186 ft near the MDL (about 0.1 pCi/g) and from about 214.5 ft to total depth at concentrations ranging from 0.1 to 4.1 pCi/g. ^{60}Co was detected below the recent reported groundwater level (223.8 ft) at a maximum concentration of 4.1 pCi/g. The 216-B-8 Crib is the closest waste site to this borehole and is located about 100 m east of the borehole.

Recognizable changes in the KUT logs occurred in this borehole. Changes of about 5 pCi/g in apparent ^{40}K activities occur at about 23, 63, 92, 194, and 221 ft. About a ¼-pCi/g increase in ^{232}Th occurs at 23 ft. The increases in the KUT log at 23 ft are attributed to the end of cement grout that was installed in 1991 (HWIS[3]). The 50-cps increase in total gamma at log depths 167 through 170 ft is attributed to about a 0.5-pCi/g increase in apparent ^{232}Th activities in the same interval.

Comparison log plots of data collected in 1992 by WHC and 2002 by MACTEC-ERS are included. The WHC ^{60}Co concentration data were decayed to the date of the SGLS logging event in January 2002. Based on the total gamma peak at 169 ft on the SGLS log and the total gamma peak at 164.5 ft on the RLS log, it appears that the logs are off-depth by about 3.5 ft below 150 ft. A smaller peak in total gamma occurs on the SGLS log at 214 ft, while this peak occurs at 210.5 ft on the RLS log. Taking into account the depth error, the apparent ^{60}Co concentrations show good agreement between the logging systems. There do not appear to be any significant changes in contaminant profile over the last ten years.

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[1] GWL – groundwater level
[2] TOC – top of casing
[3] HWIS – Hanford Well Information System
[4] N/A – not applicable

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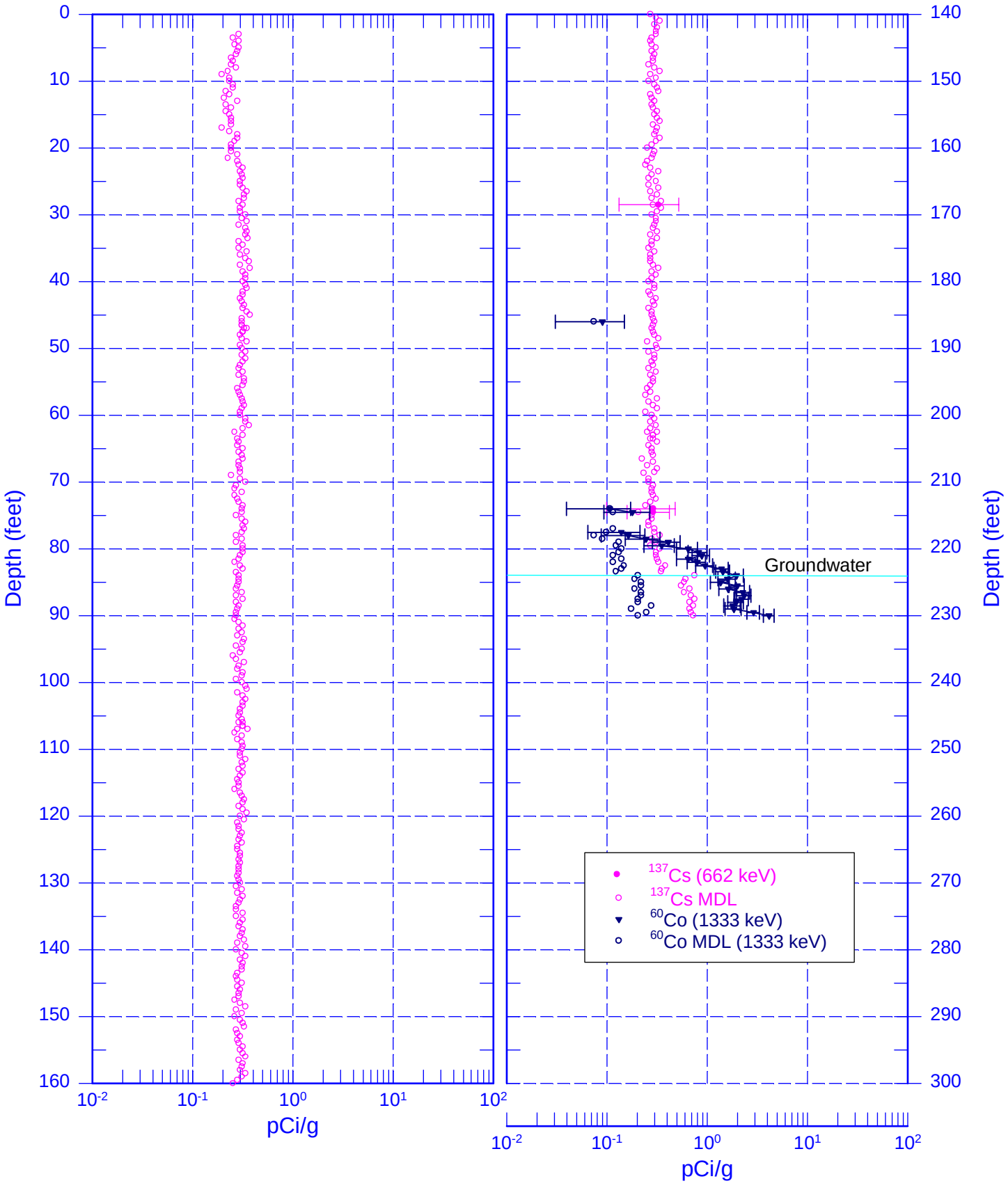
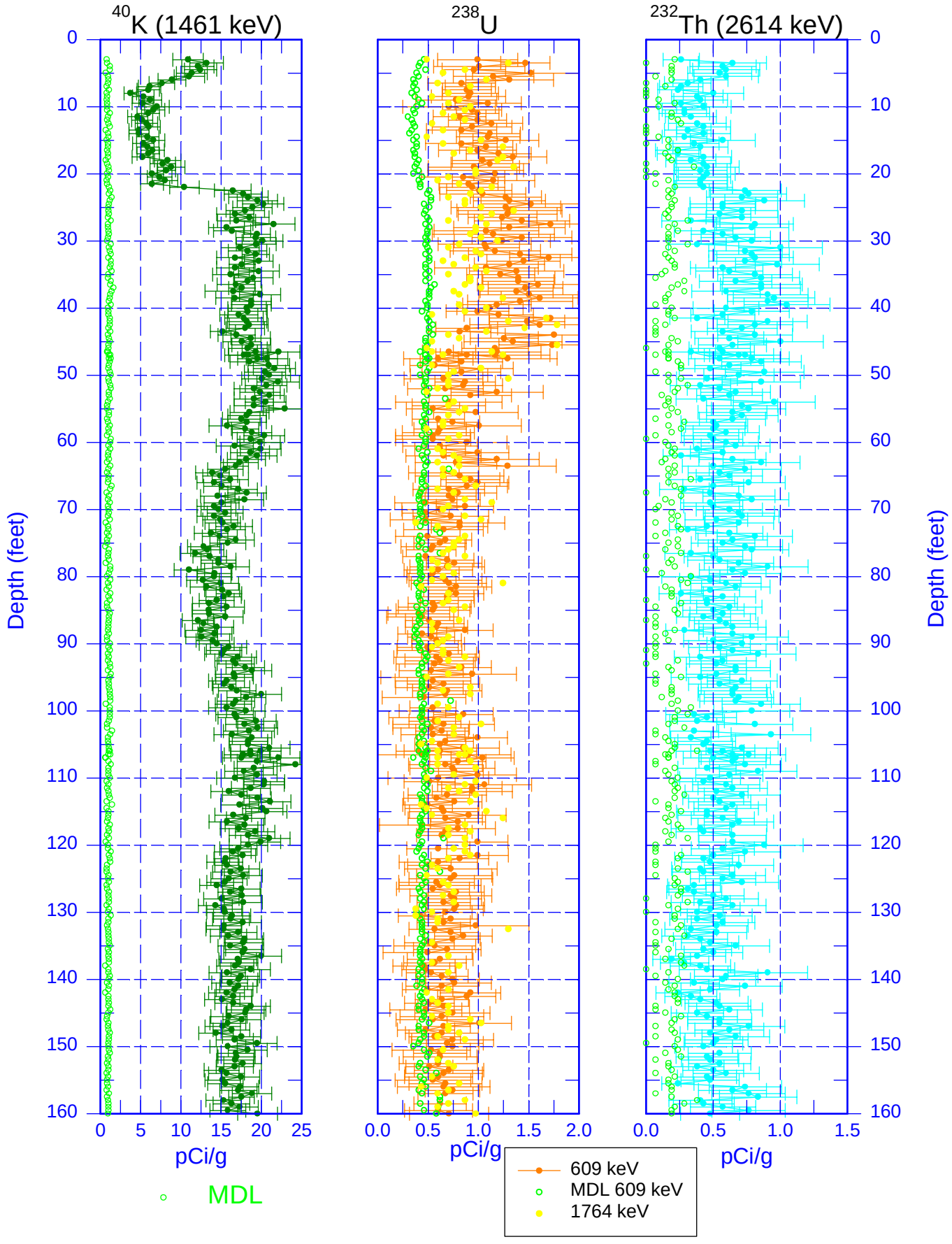
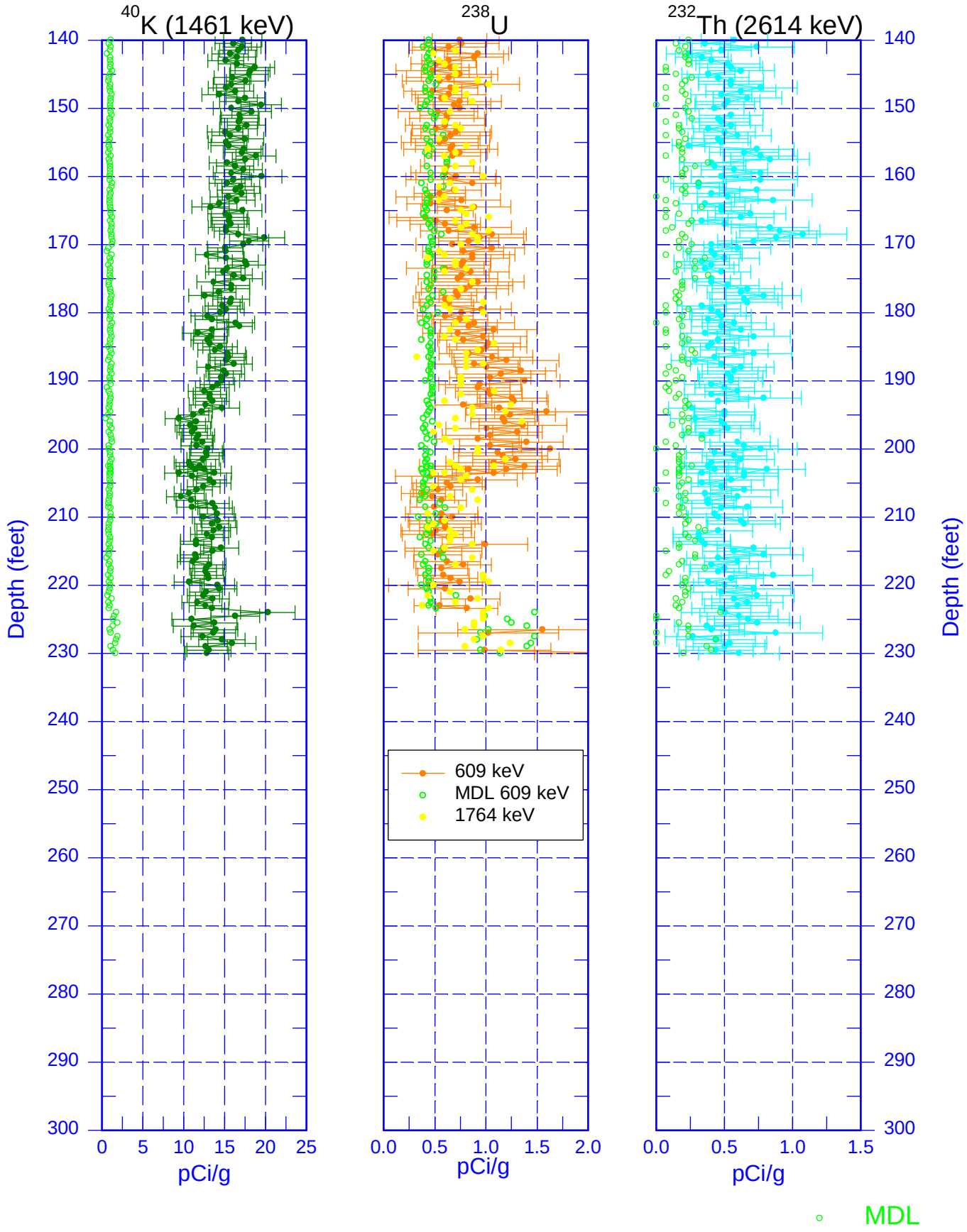
Man-Made Radionuclides



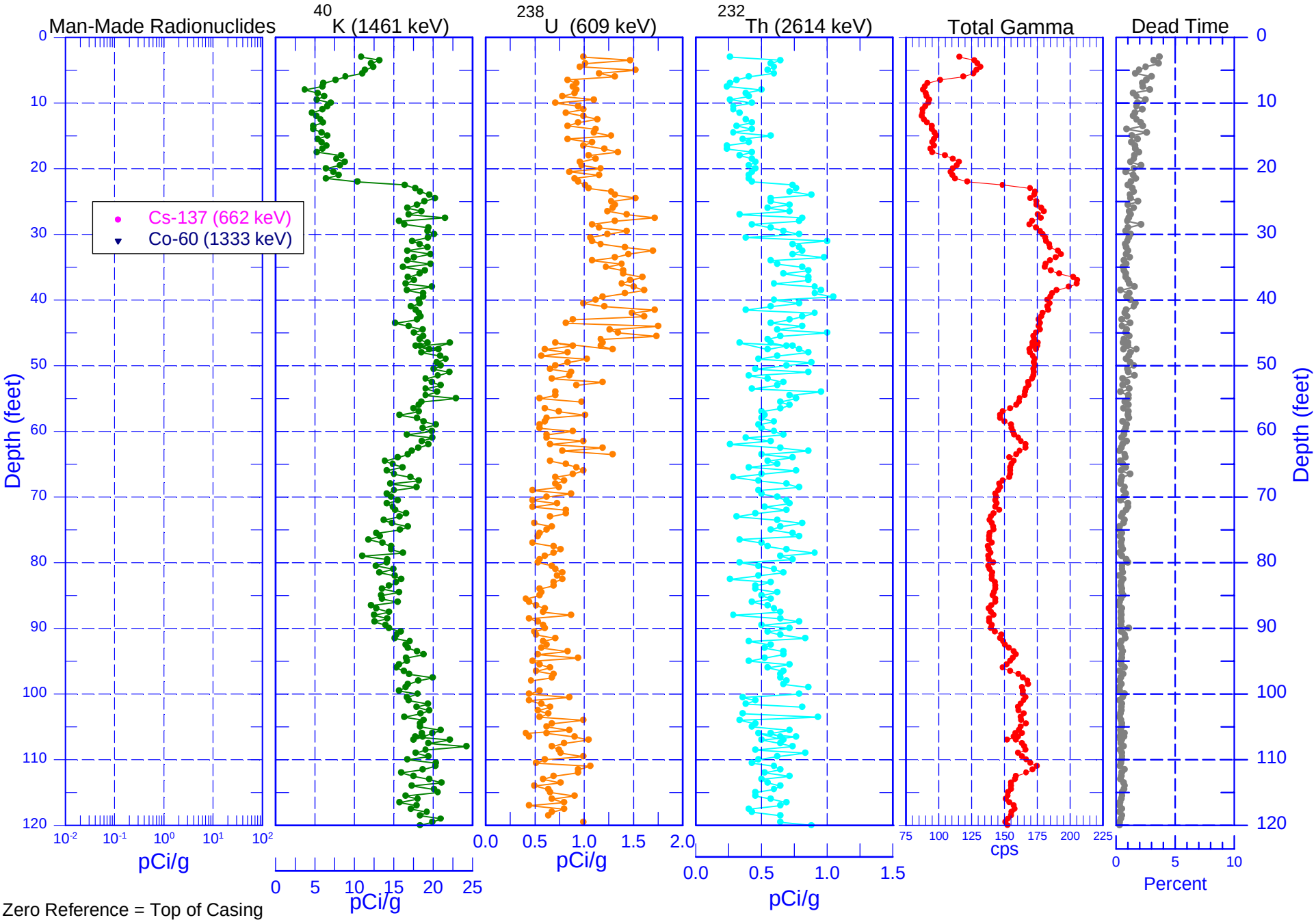
299-E33-14 (A4841)
Natural Gamma Logs



299-E33-14 (A4841)
Natural Gamma Logs

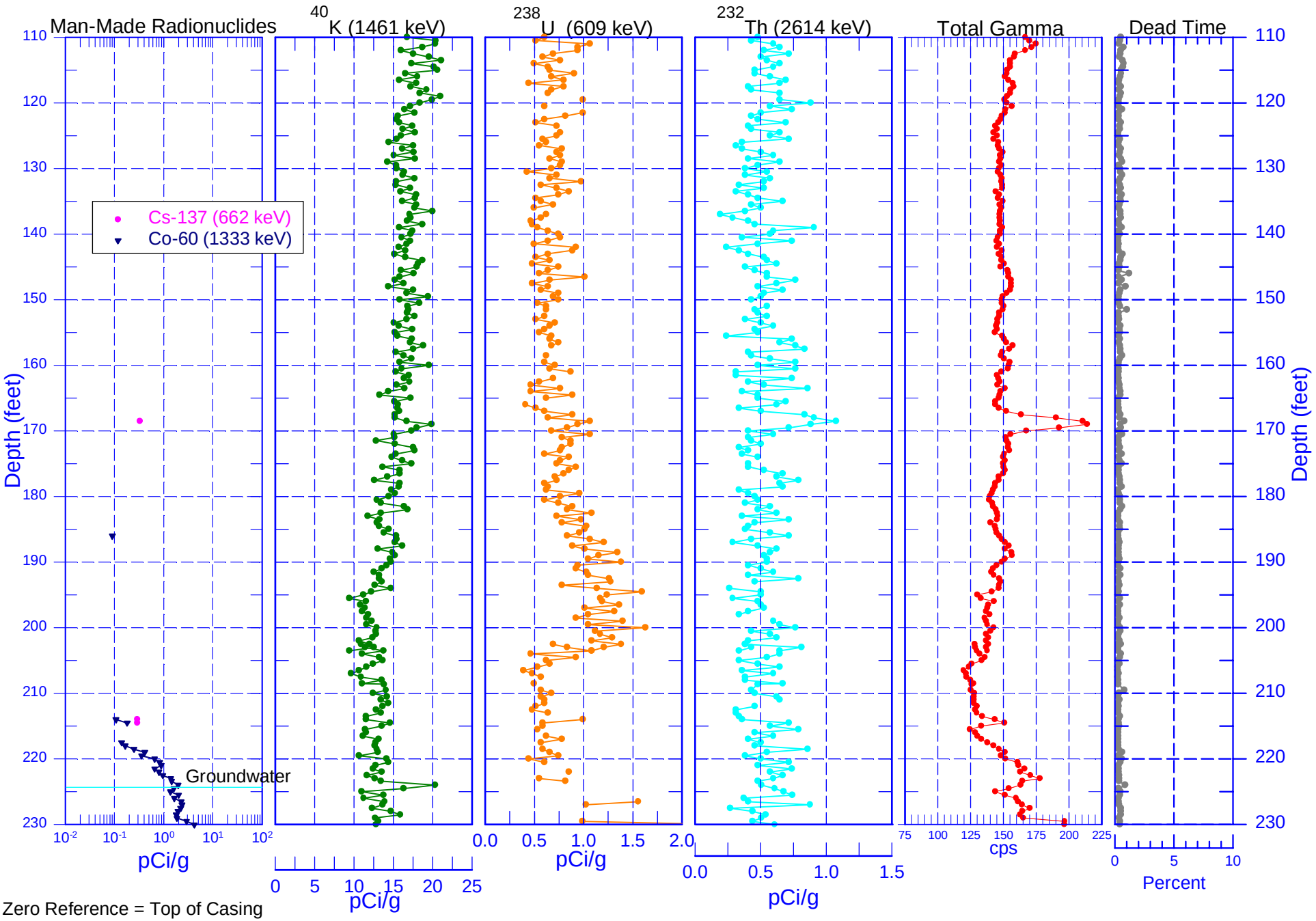


299-E33-14 (A4841) Combination Plot



Zero Reference = Top of Casing

299-E33-14 (A4841) Combination Plot



Zero Reference = Top of Casing

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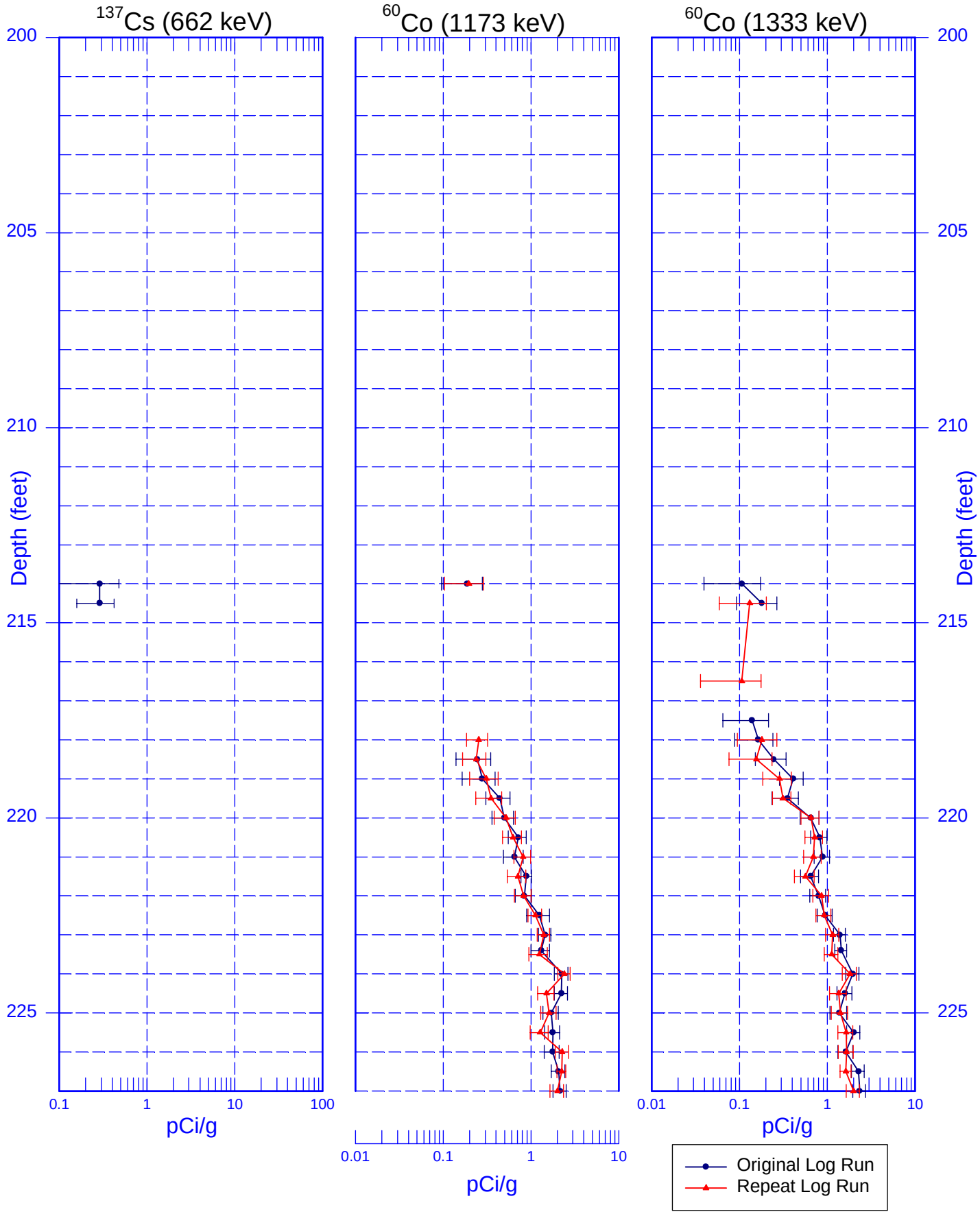
Rerun of Man-Made Radionuclides (200-227 ft)



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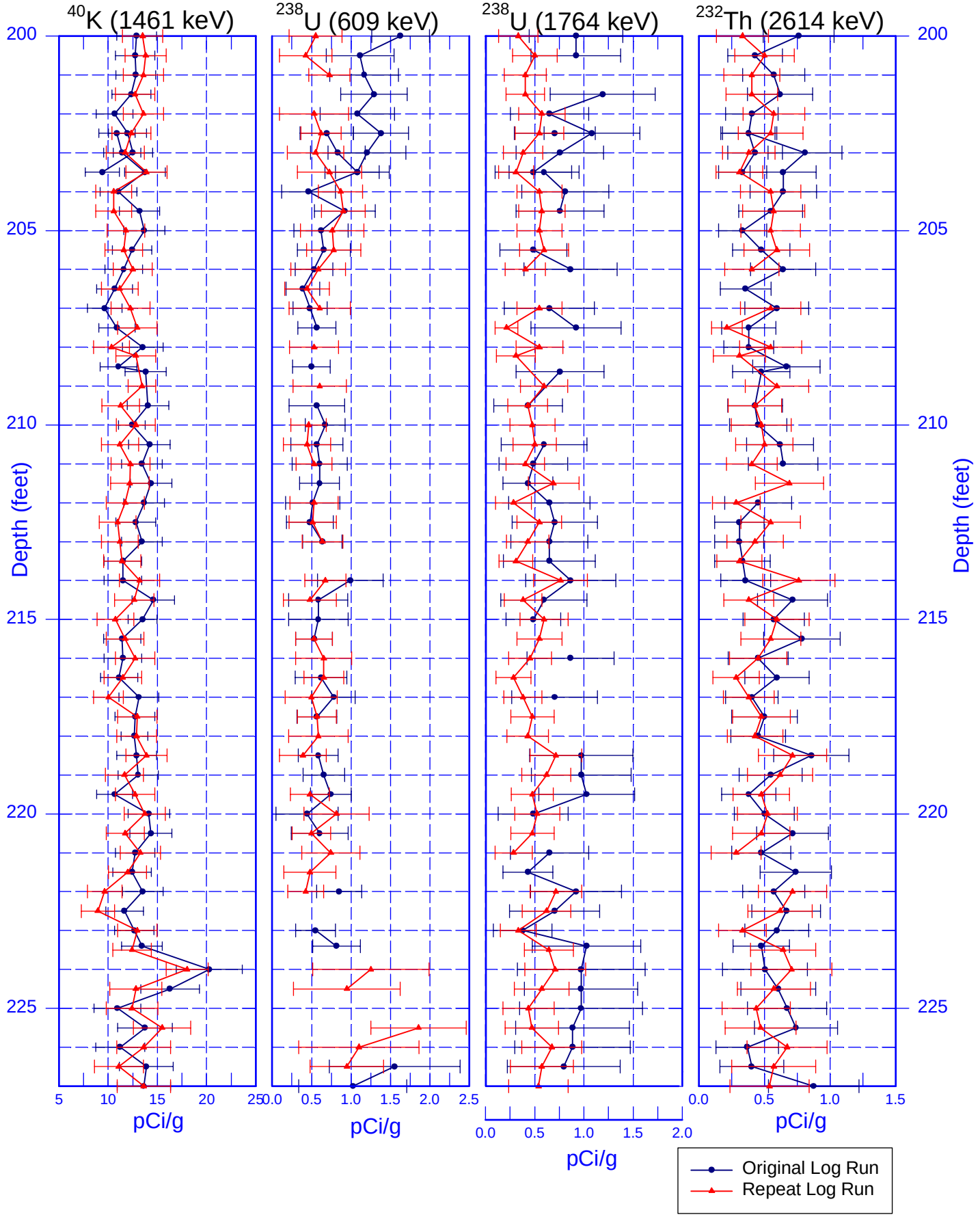
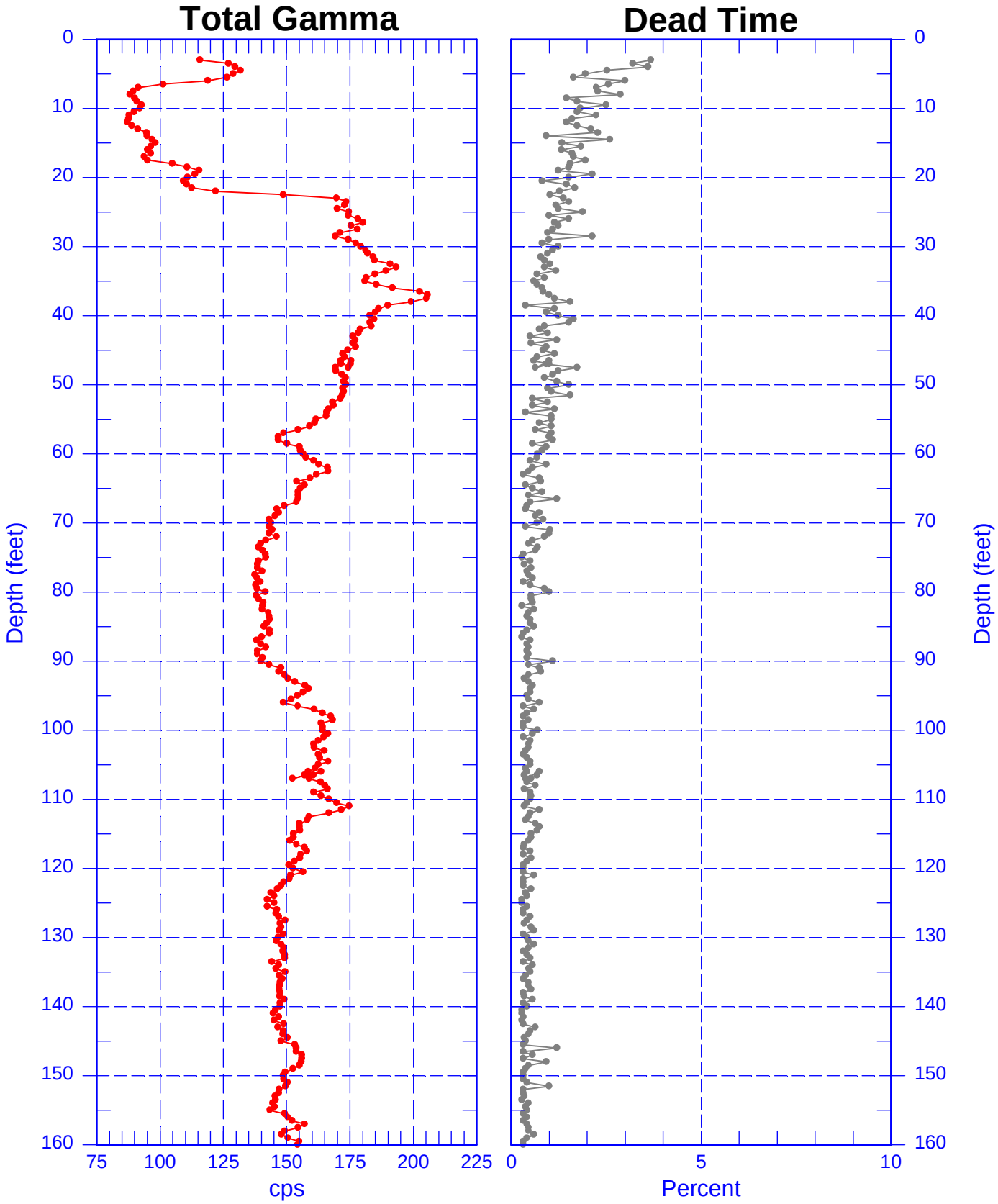
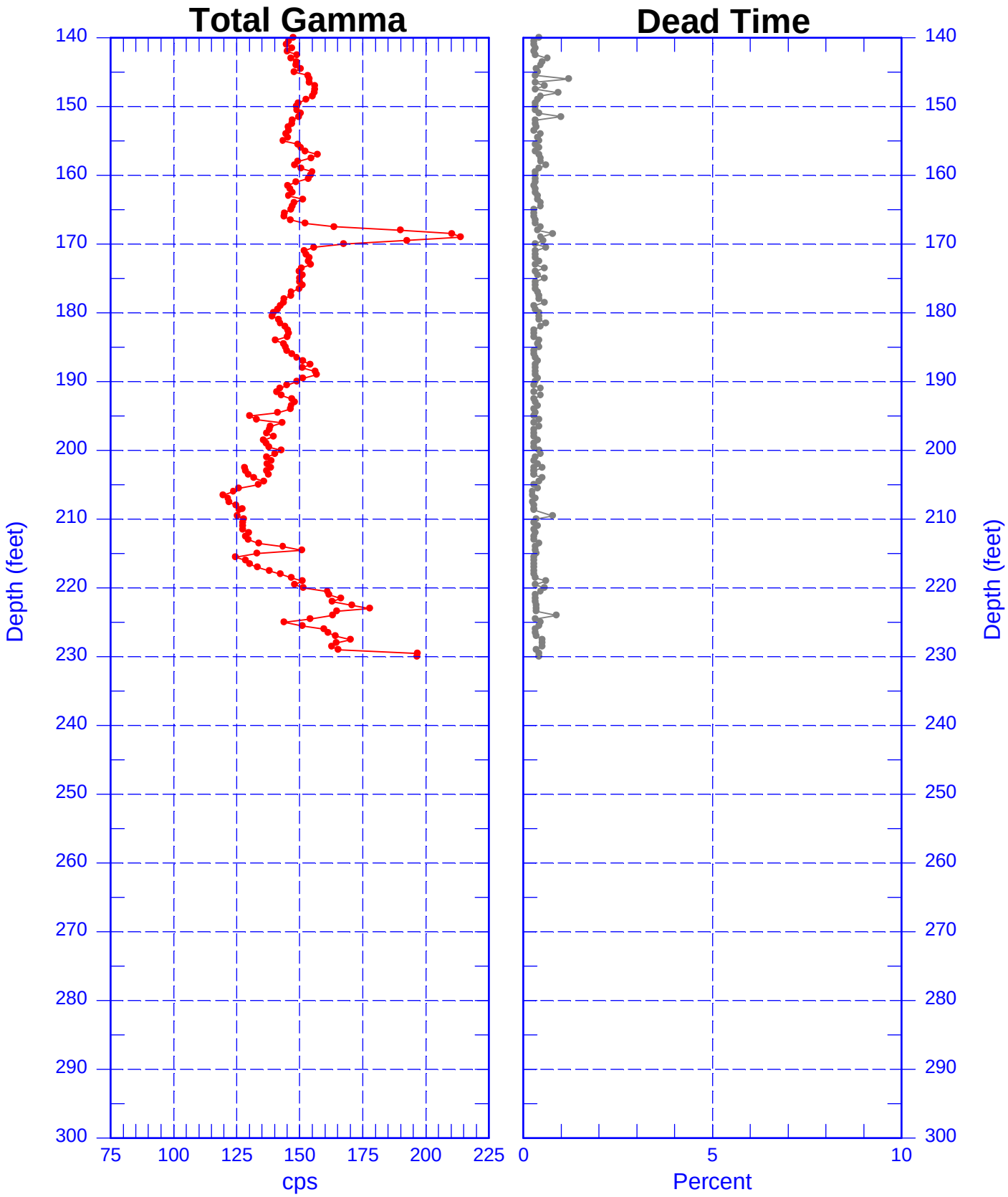
Rerun of Natural Gamma Logs



299-E33-14 (A4841)
Total Gamma & Dead Time



299-E33-14 (A4841)
Total Gamma & Dead Time



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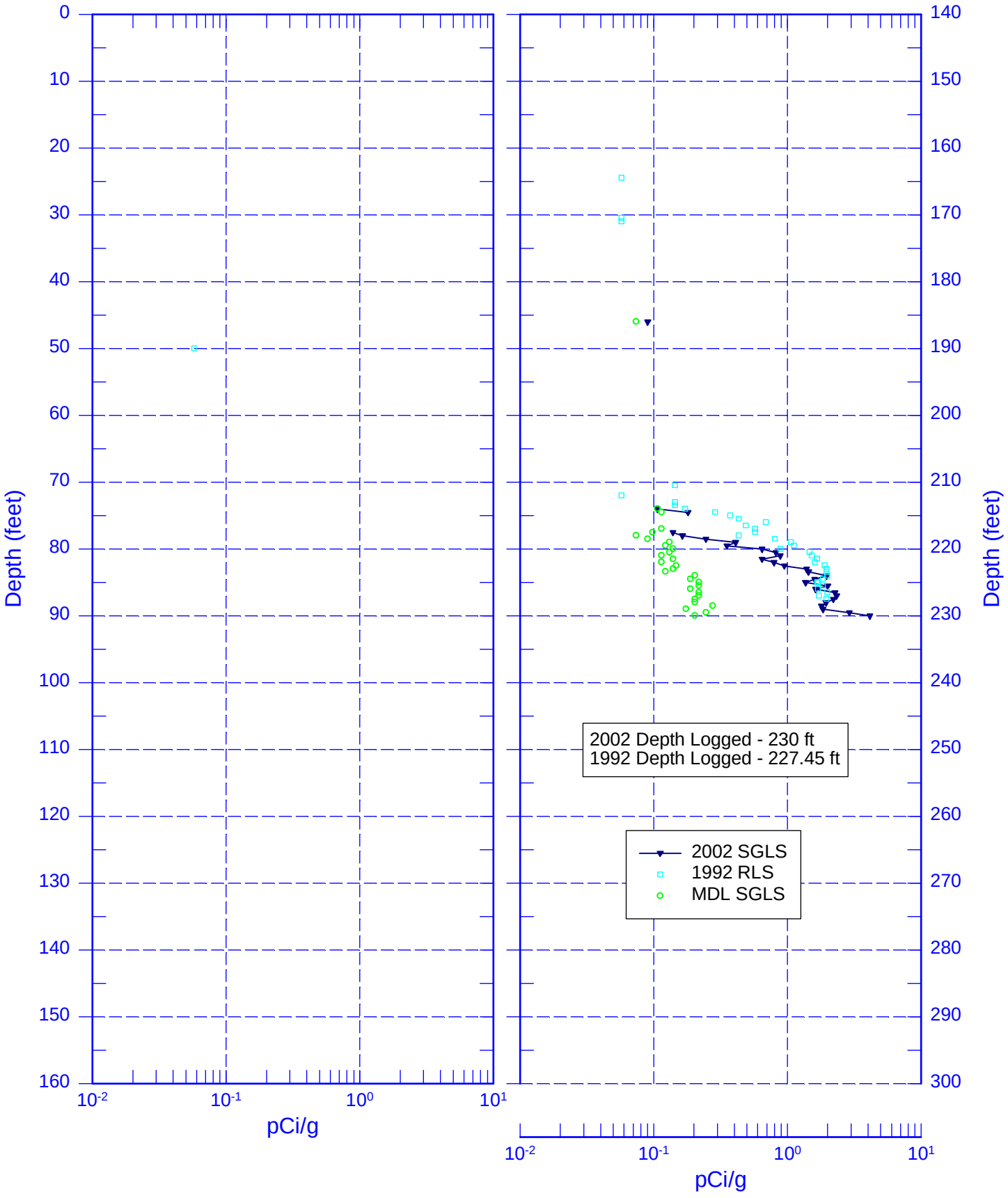
RLS Data Compared to SGLS Data

^{60}Cobalt Decayed to 01/22/2002



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SGLS (2002) versus RLS (1992)